UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

COREPHOTONICS, LTD. Plaintiff, vs. APPLE INC. Defendant.	Case No. 3:17-cv-06457-JD (Lead Case) Case No. 5:18-cv-02555-JD

SUPPLEMENTAL DECLARATION OF JOHN C. HART REGARDING CLAIM CONSTRUCTION

I, John C. Hart, declare and state as follows:

I. INTRODUCTION

1. I have been retained as an expert in the above-captioned case by Corephotonics, Ltd. ("Corephotonics"). I previously submitted a declaration regarding the claim construction of certain terms of the two patents asserted in this case: U.S. Patent Nos. 9,185,291 (the "'291 patent") and 9,568,712 (the "'712 patent") (together, the "Asserted Patents"). I understand that declaration was filed in this case on September 29, 2022, and I will refer to it as my "First Declaration" herein.

2. I have been asked to consider and opine on the claim construction for a particular term in the '291 patent, "camera controller." My opinion on that term is set forth herein in this Supplemental Declaration.

3. My First Declaration contains statements regarding my compensation, qualifications, my understanding regarding relevant legal principles, and my opinions regarding the level of skill of a person of ordinary skill in the art ("POSITA") and the proper constructions of various disputed terms. I incorporate my First Declaration and the statements therein as if set forth fully here in this Supplemental Declaration.

II. ADDITIONAL STATEMENTS REGARDING MY UNDERSTANDING OF LEGAL PRINCIPLES

4. I understand that, under 35 U.S.C. §112(f), "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. §112(f). I understand that the standard for determining whether §112(f) applies is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure. Where a claim term lacks the word "means," there is a

presumption that §112(f) does not apply. To rebut this presumption, the challenger must demonstrate that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. I understand this presumption cannot be overcome without a showing that the claim limitation is devoid of anything that can be construed as a structure.

III. "CAMERA CONTROLLER" (*'291 patent, claim 1*)

Corephotonics' Proposed Construction	Apple's Proposed Construction
No construction necessary; plain and ordinary meaning; not means-plus-function and not subject to or governed by §112(6) / §112(f). In the alternative, if governed by §112(6)/(f), functional language is: "camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution"; Corresponding structure is any of the following: '291 patent, at 6:10-36; 9:15-44; 11:6-12:2, FIG. 1A (object 114), FIG. 5, FIG. 6.	Unknown

5. I agree with Corephotonics' proposal for this claim term because "camera controller" has a plain and ordinary meaning that does not require any further construction. A "camera controller" one or more components (including software and/or hardware) within a system that are responsible for communicating information between a camera and other components in the system being controlled.

6. I understand that this claim term is not subject to 35 U.S.C. § 112(f), because this claim term does not include the word "means," and it is presumed that Section 112(f) does not apply. I also understand that the law recognizes that "nonce" words in a claim term may indicate that it

should be construed according to Section 112(f), but I am not aware of this claim term ("camera controller") ever being considered such a "nonce" term. This claim structure connotes structure for performing the claimed functions of "combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view" and "provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution." Specifically, a POSITA would understand that a "camera controller" in the context of the patent is connected to and used to control the two cameras of the claims, which includes sending information to the cameras and receiving and processing information from the cameras to, among other things, generate images and video frames.

7. The class of structures corresponding to a "camera controller" would be known to a POSITA as including hardware and/or software specifically designed to be connected to, and transmit and receive information from, cameras. These are well-known structures in the art and were well known to a POSITA at the time of the patent.

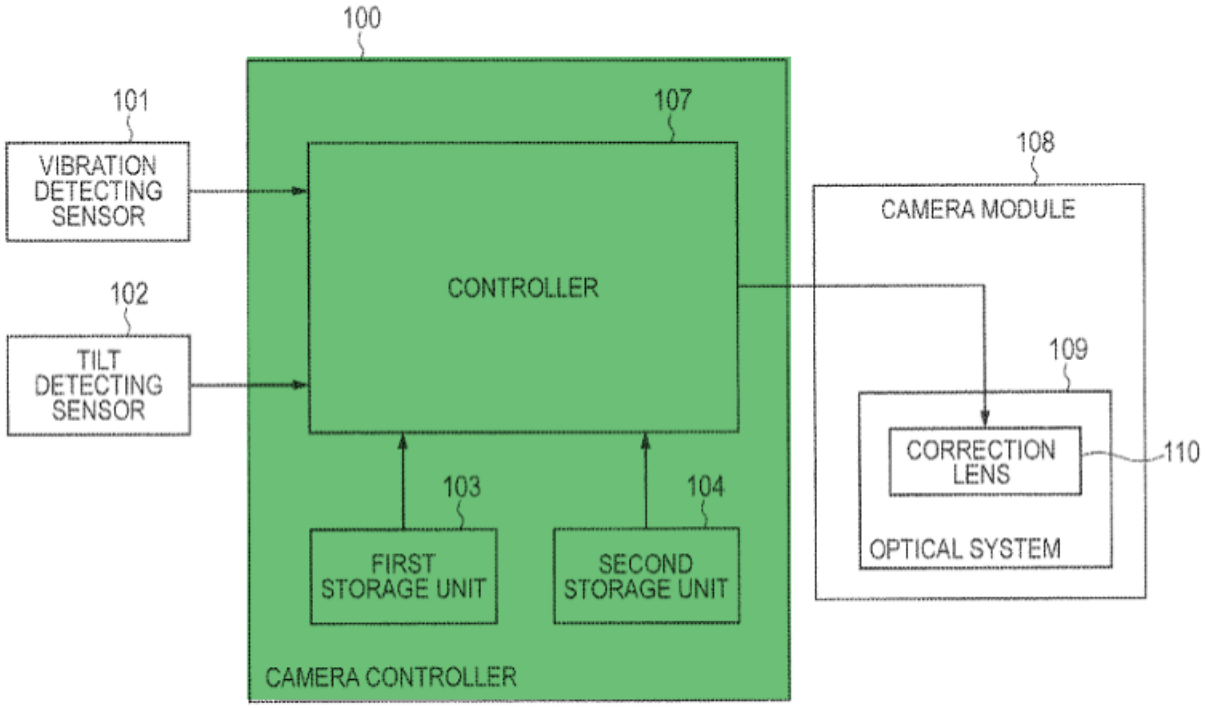
8. Thus, a "camera controller" is a structural element, and a POSITA would understand this claim term to refer to structure. The term "controller," likewise, is a structural element that any POSITA would understand to be component of a system that is used to control a connected component or peripheral device within the system. Neither "controller" nor, more importantly, "camera controller" are nonce terms which serve as merely written constructs or placeholders to a POSITA, which is demonstrated in both technical literature and engineering dictionaries that define, discuss, and refer to "controllers" as a specific structure within a system that has other components to be controlled.

9. The IEEE's Authoritative Dictionary of IEEE Standards Terms (7th edition, 2000) likewise defines "controller" several ways, each of which makes clear it is a structural term. A first IEEE definition of "controller" describes a system controller. "The component of a system that functions as a system controller. A controller typically sends program messages to and receives response message from devices." Ex. 1, at 2.[1] A second IEEE definition of "controller" describes a peripheral controller. "A functional unit in a computer system that controls one or more units of the peripheral equipment." These definitions, and the fact that "controller" has a technical definition in the electrical and computing arts, both demonstrate that "controller" is a term which conveys structure common to a class of known structures. The claimed "camera controller" falls within the well-known structure of the "peripheral controller" described by the second IEEE definition.

10. As further evidence supporting my opinion, the term "camera controller" is a term that is widely used in the art, as shown in the countless imaging and camera-related U.S. patents that a person is able to find by simply searching for "camera controller" in a public patents database such as Google Patents (http://patents.google.com). When I searched that term alone on Google Patents on July 7, 2023, the search yielded 38,451 results. The incredibly widespread use of this term in the field shows that it is well understood as the name for a structure or class of structures, and not merely a functional or nonce term. I briefly discuss just a few of those results below to further illustrate the basis of my opinion that "camera controller" is not recognized or used by POSITAs as a mere nonce term or pure placeholder tied to some claimed functionality.

[1] The exhibits I have cited to are attached to an attorney declaration which I understand will be filed with my Supplemental Declaration.

11. U.S. Patent Application Publication 2018/0184005 to Morotomi et al. ("Morotomi"), titled "Camera Controller, and a Calibration Method for a Correction Lens," states that it is about an invention which "relates to a camera controller and a calibration method for a correction lens of a camera and, for example, relates to a method of adjusting displacement of the position of the correction lens caused by a force varying in accordance with a tilt of the camera, a suspension supporting the correction lens, or the like." Morotomi, at [0002]. Morotomi claims a "camera controller controlling image stabilization of a camera module," where the "camera controller" comprises various substructures like "a first storage unit that stores therein a first correction amount for a standard tilt of the camera module, with respect to a first force that varies in an acting direction in a camera coordinate system in accordance with a tilt of the camera module" and a "second storage unit that stores therein a second correction amount with respect to a second force that does not vary in an acting direction in the camera coordinate system in accordance with the tilt of the camera module." Morotomi, cls. 1-2. Figure 1 of Morotomi illustrates that its camera controller (in green) is connected to various other components in the system, including the camera module (which includes a lens) as well as vibration and tilt detection sensors. *See, e.g.*, Morotomi, Fig. 1:



12. U.S. Patent Application Publication 2021/0318798 to Manzari, titled "User Interface Camera Effects" (Manzari), is a patent application assigned to Apple. Manzari is directed to various improvements to the user interface for capturing a photograph with a small-form factor electronic device like a tablet or cell phone. Among other disclosures, Manzari discusses a preferred embodiment with a touch screen display and an I/O subsystem (which, in the context of modern cell phones, refers to the system-on-chip (SoC) board that aggregates various chips and software logic for controlling various peripheral components on the cell phone, including things like the display and camera. Unsurprisingly, Manzari says that the I/O subsystem includes "display controller 156, optical sensor controller 158, intensity sensor controller 159, haptic feedback controller 161, depth camera controller 169, and one or more input controllers 160 for other input or control devices." Manzari, at [0086]. Consistent with how the term is used in the art, the "controllers" in Manzari are a part of a I/O subsystem and are each connected to and control discrete components within the overall system.

13. As for Manzari's "depth camera controller 175," it is shown in Manzari's Fig 1A: "FIG. 1A shows a depth camera sensor coupled to depth camera controller 169 in I/O subsystem 106. Depth camera sensor 175 receives data from the environment, projected through a sensor. In conjunction with imaging module 143 (also called a camera module), depth camera sensor 175 camera is optionally used to determine a depth map of different portions of an image captured by the imaging module 143." Manzari at [0101]. Fig. 1A of Manzari is excerpted below in relevant part to show the structural connections between the depth camera controller (in green), depth camera sensor, and the rest of the components in the system:

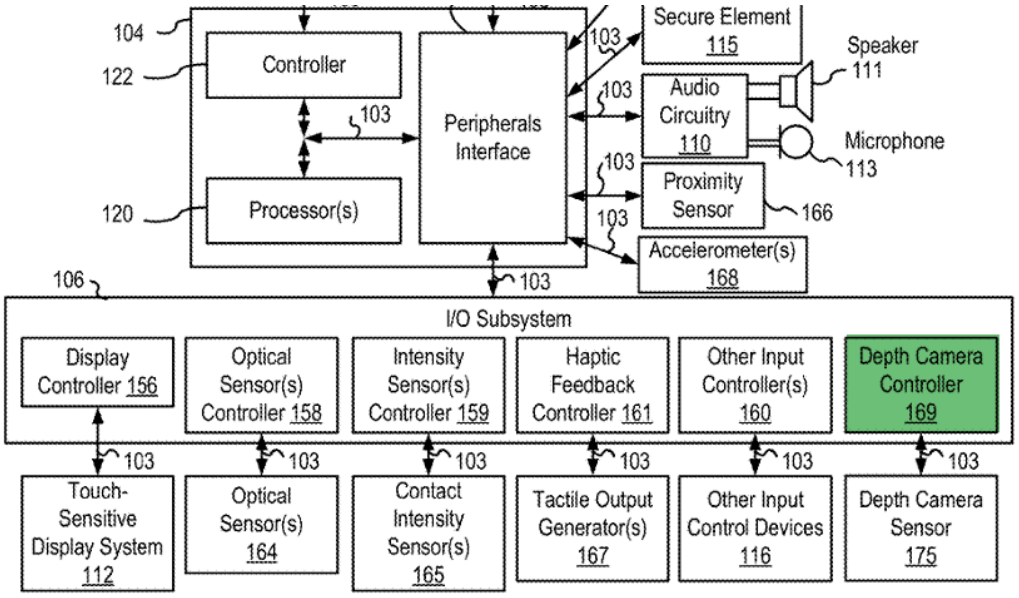


FIG. 1A

14. As further evidence supporting my opinion that "camera controller" is not a nonce term, "camera controller" is a term used by persons of ordinary skill authoring technical articles in the industry and has been for many decades. For example, Nicholas R. Waltham, Ian G. van Breda, and Graham M. Newton "Simple transputer-based CCD camera controller", Proc. SPIE 1235, Instrumentation in Astronomy VII, (1 July 1990), is directed to a particular design of camera controller as a part of a CCD-based camera. Even in 1990, a "camera controller" was understood

to be a piece of hardware for use in a camera system. For example, the Waltham article, at 239-330, lists the electronic structures comprising the camera hardware discussed in the article:

3. CAMERA HARDWARE

All the electronics associated with reading out a CCD, and digitising the data, are located within an enclosure small enough to be mounted on the side of the cryostat (Figure 1).

The electronics are divided into the following subsystems, each on its own printed circuit card:

(i) Transputer camera controller and waveform generator;

(ii) CCD clock driver and DC bias voltage supplies;

(iii) Video signal processor;

(iv) 'personality' card, responsible for camera house-keeping functions;

15. Likewise, Waltham, at 335, also provides that the CCD camera controller software "was written in the Occam language," further demonstrating that the structure connoted by "camera controller," even in 1990, included software logic for controlling a camera.

16. The intrinsic evidence of the '291 patent supports my opinion and is consistent with the evidence I have described above. The image fusion and video zoom embodiments discussed in the specification of the '291 patent are performed by what the specification describes as a "camera controller." Likewise, claim 1 specifies, as sub-element (c), "a camera controller operatively coupled to the Wide and Tele imaging sections, the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image" and "to provide without fusion continuous zoom video mode output images of the object or scene; wherein the video output images are provided with a smooth transition when switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa . . . ."

17. Figure 1A of the '291 patent "shows schematically a block diagram illustrating a dual-aperture zoom imaging system" discussed in the patent. Figure 1A is reproduced below.

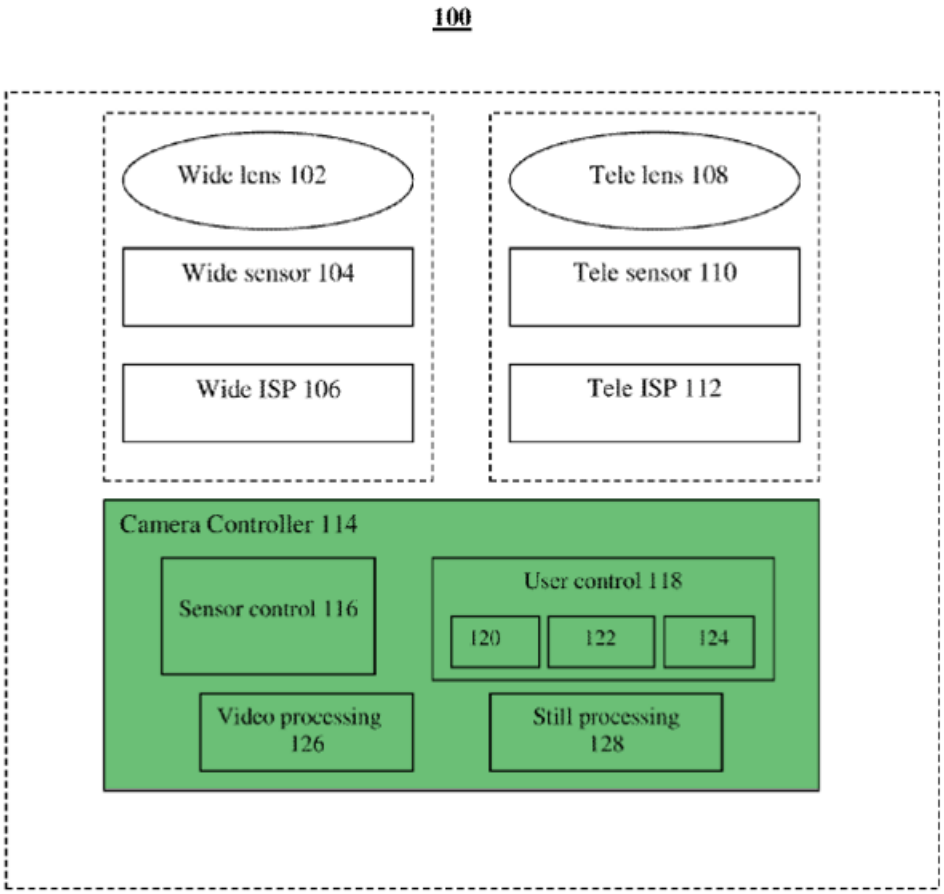


FIG. 1A

18. In relevant part, the '291 patent states, in reference to Figure 1A, that "[c]amera 100 further comprises a camera fusion processing core (also referred to as 'controller') 114 that includes a sensor control module 116, a user control module 118, a video processing module 126 and a capture processing module 128, all operationally coupled to sensor control block 110." '291 patent, at 6:10-18. "Camera Controller 114," which comprises a "camera fusion processing core," specifically includes sub-systems such as "sensor control 116," "user control 118," "video processing 126," and "still processing 128." Camera controller 114—the "camera fusion processing core"--is coupled to the Wide and Tele cameras (highlighted in green) and specifically receives and processes information from those cameras as well as controls how the cameras capture information. '291 patent, 6:19-23 ("Sensor control module 116 is connected to the two sub-

cameras and to the user control module 118 and used to choose, according to the zoom factor, which of the sensors is operational and to control the exposure mechanism and the sensor readout."); cl. 1 ("a camera controller operatively coupled to the Wide and Tele imaging sections").

19. The camera controller is described in various embodiments as applying configuration information to the image sensors of the cameras to which the controller is connected to, for example, to prevent matching fields-of-view from being captured (*id.* 7:42-45 ("To prevent matching FOVs in both sensors to be scanned at different times, a particular configuration is applied by the camera controller on both image sensors while keeping the same frame rate.")), synchronizing camera sensors (*id.* 7:62-64 ("camera controller synchronizes the Wide and Tele sensors so that for both sensors the rolling shutter starts at the same time"), and performing other tasks for the operation of a digital camera.

20. To the extent "camera controller" is determined by the Court to be a nonce term and/or subject to means plus function treatment, the claims would still provide reasonable certainty to a POSITA. The "functional" language at issue here would be the claim phrase that immediately follows "camera controller configured to," which reads: "to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution." The specification and claims provide sufficient structure corresponding to the claimed functions. Claim 1 itself, for example, says that it requires the "camera controller" be "operatively coupled to the Wide and Tele imaging sections." Other disclosure of structure for such functionality would be any combination of the numerous disclosures in the specification discussing those aspects of the invention, which includes '291 patent, at 6:10-36; 9:15-44; 11:6-12:2, FIG. 1A (object 114), FIG. 5, and FIG. 6.

21. Column 6 of the patent states that that the "a camera fusion processing core (also referred to as 'controller') 114 that includes a sensor control module 116, a user control module 118, a video processing module 126 and a capture processing module 128, all operationally coupled to sensor control block 110." *Id.* at 6:10-36. The camera controller is illustrated as object 114 in Figure 1A of the patent. Column 9 and Figure 5 discuss and show the image fusion embodiments that correspond to the fusion-related functionality in the claim ("to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view"). *Id.* 9:15-44. Figure 5 is specifically described as "an embodiment of a method disclosed herein for acquiring a Zoom image in still mode," and step 512 of Figure 5 is labeled as: "Fusion: fuse the decision output, re-sampled Tele image and Wide image into a fused zoom image." *Id.*

22. Columns 11 and 12, and Figure 6, illustrated an embodiment that correspond to the zoom video portion of the claimed functionality ("to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution"). Columns 11 and 12 and Figure 6 show, for example, "an embodiment of a method disclosed herein for acquiring a zoom image in video/preview mode." *Id.* at 11:6-7. Figure 6 contains several steps, some optional, which result in step 614: "Resample the processed image according to the transformation coefficient, requested ZF and output video resolution." *Id.* Fig. 6.

23. As of the time of this declaration, Apple has not identified any extrinsic evidence supporting its proposed position, including no expert testimony. Should Apple provide such information in the future, I reserve the right to supplement my analysis accordingly. I reserve the right to supplement my analysis once Apple provides further information regarding its position as to the construction of "camera controller."

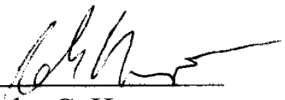
24. To the extent Apple argues that the term "camera controller" is governed by Section 112(6), I disagree. I have not been made aware of any evidence or argument from Apple that the "camera controller" is governed by Section 112(6), and so I reserve the right to address such evidence or argument when it is provided.

25. Even if the court were to make the determination that "camera controller" is a term subject to Section 112(6), the claims would still provide reasonable certainty to a POSITA. This is because the specification and claims provide sufficient structure corresponding to the claimed functions, as detailed above. A POSITA would understand with reasonable certainty the scope of this claim term, including with reference to the numerous embodiments I have described above.

26. Thus, I agree with Corephotonics' proposed construction for "camera controller."

I declare under penalty of perjury that the foregoing is true and correct.

Executed July 10, 2023, in Champaign, Illinois.

By: 
John C. Hart